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(54) **TECHNIQUES FOR BEHAVIORAL PAIRING IN A TASK ASSIGNMENT SYSTEM**

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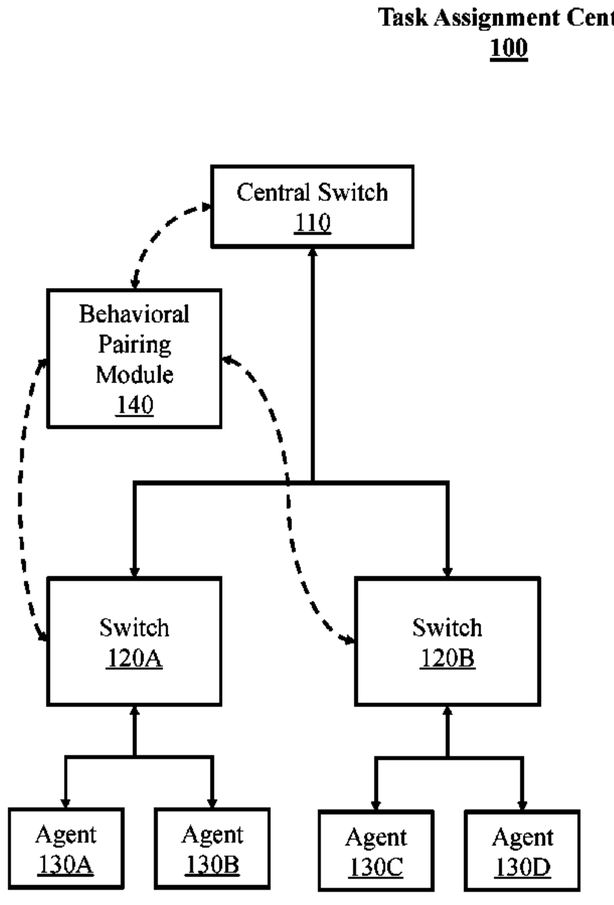
(57) **ABSTRACT**

Techniques for behavioral pairing in a task assignment system are disclosed. In one particular embodiment, the techniques may be realized as a method for behavioral pairing in a task assignment system comprising: determining, by at least one computer processor communicatively coupled to and configured to operate in the task assignment system, information about a task waiting for assignment in the task assignment system; and selecting, by the at least one computer processor, a hold activity from a plurality of hold activities for the task based on the information about the task, wherein the selected hold activity is expected to improve performance of the task assignment system.

24 Claims, 3 Drawing Sheets



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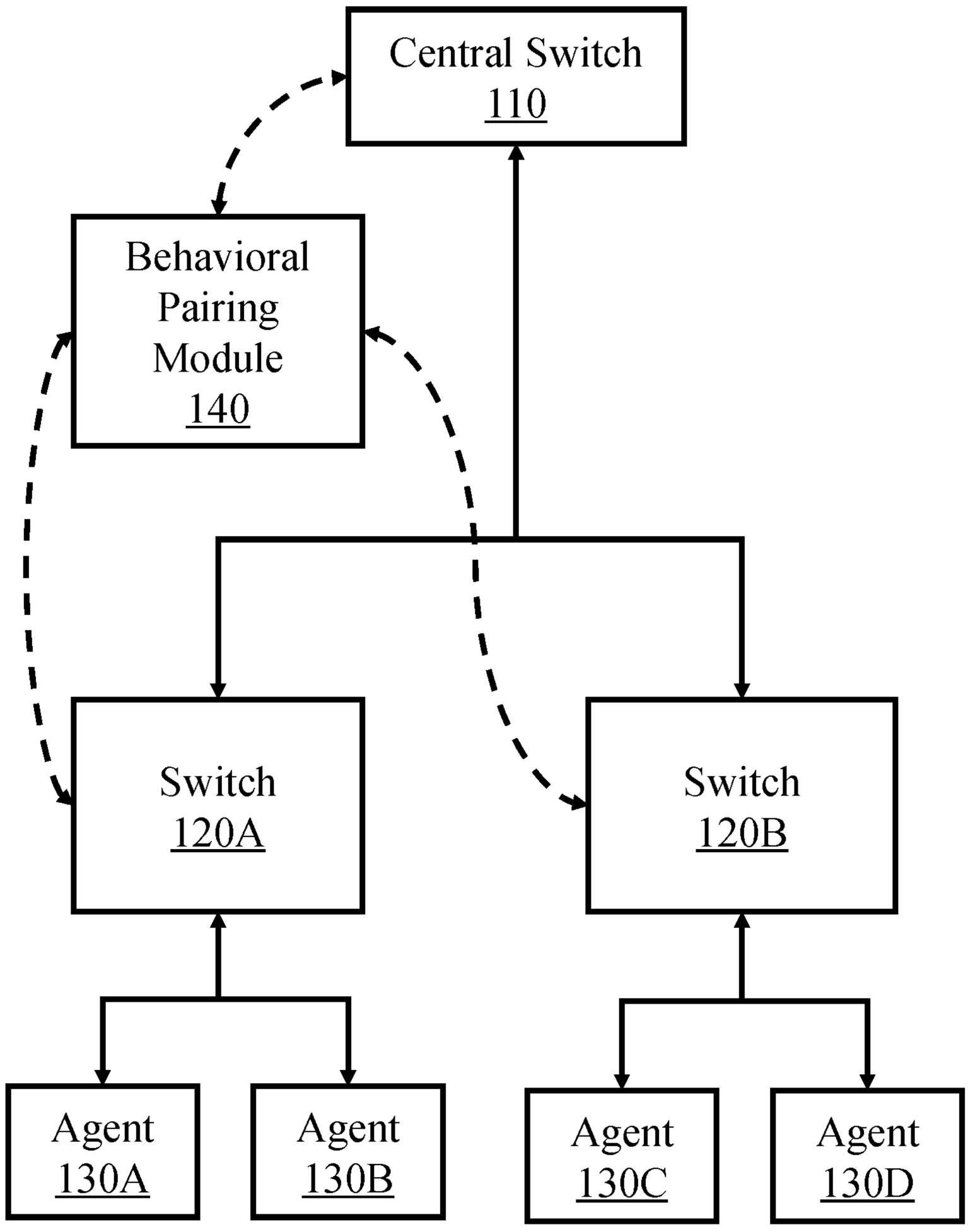
Task Assignment Center
100
Central Switch
110
Behavioral
Pairing
Module
140
Switch
120A
Switch
120B
Agent
130A
Agent
130B
Agent
130C
Agent
130D

FIG. 1

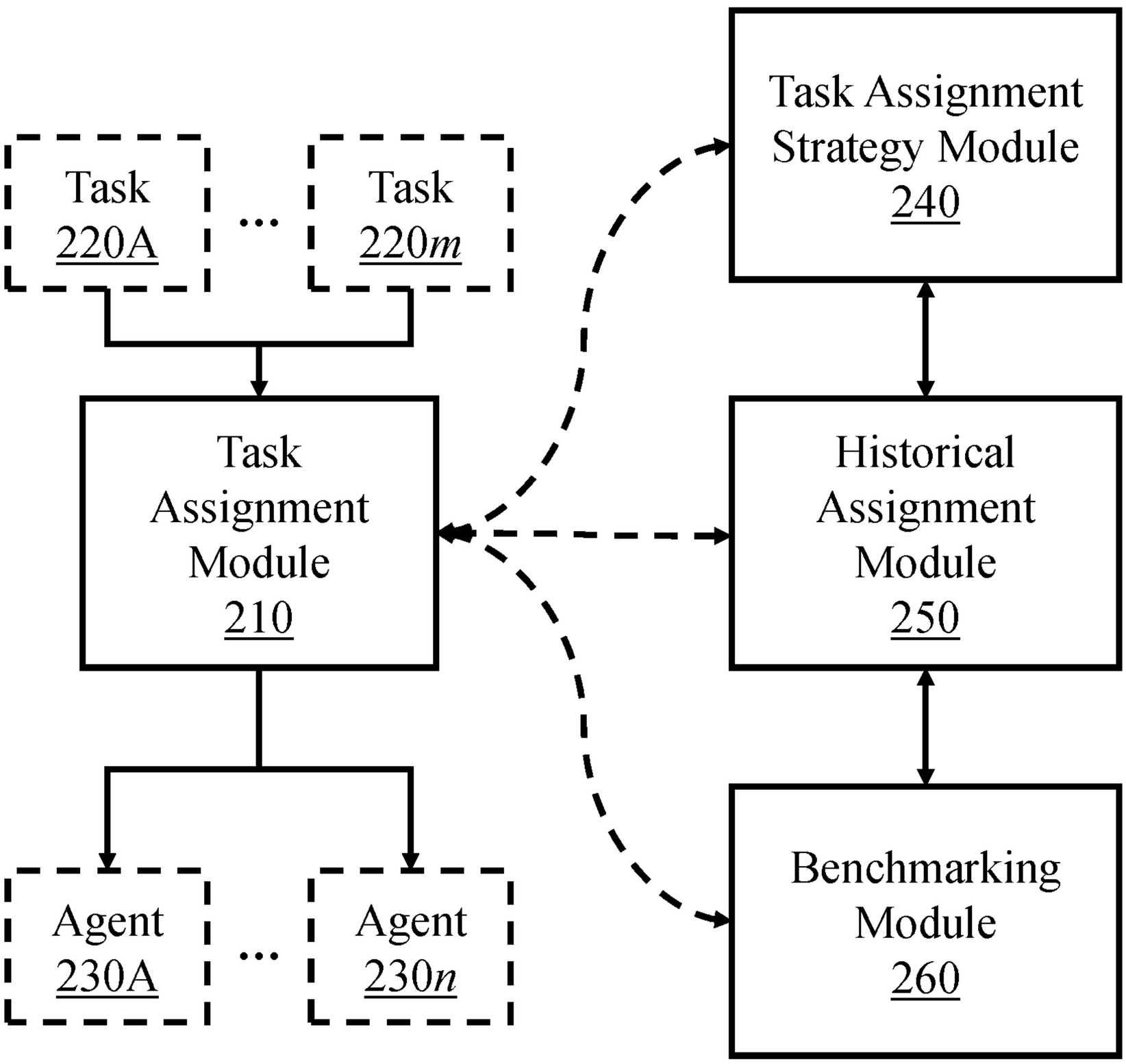
Task Assignment System
200
Task
220A
...
Task
220m
Task Assignment Strategy Module
240
Task Assignment Module
210
Historical Assignment Module
250
Agent
230A
...
Agent
230n
Benchmarking Module
260

FIG. 2

Task Assignment Method
300

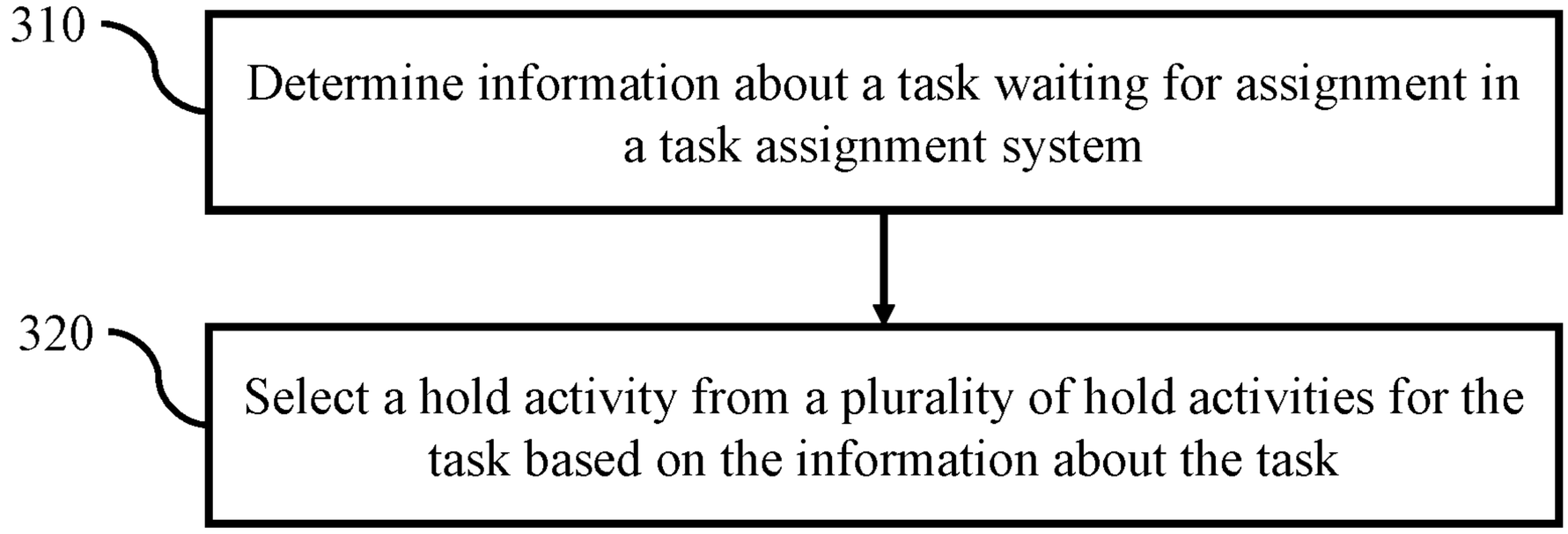

FIG. 3

TECHNIQUES FOR BEHAVIORAL PAIRING IN A TASK ASSIGNMENT SYSTEM

FIELD OF THE DISCLOSURE

The present disclosure generally relates to task assignment systems, more particularly, to techniques for behavioral pairing in a task assignment system.

BACKGROUND OF THE DISCLOSURE

A typical task assignment system algorithmically assigns tasks arriving at a task assignment center to agents available to handle those tasks. At times, the task assignment center may be in an "L1 state" and have agents available and waiting for assignment to tasks. At other times, the task assignment center may be in an "L2 state" and have tasks waiting in one or more queues for an agent to become available for assignment. At yet other times, the task assignment system may be in an "L3 state" and have multiple agents available and multiple tasks waiting for assignment. An example of a task assignment system is a contact center system that receives contacts (e.g., telephone calls, internet chat sessions, emails, etc.) to be assigned to agents.

In some typical task assignment centers, tasks are assigned to agents ordered based on time of arrival, and agents receive tasks ordered based on the time when those agents became available. This strategy may be referred to as a "first-in, first-out," "FIFO," or "round-robin" strategy. For example, in an L2 environment, when an agent becomes available, the task at the head of the queue would be selected for assignment to the agent.

In other typical task assignment centers, a performance-based routing (PBR) strategy for prioritizing higher-performing agents for task assignment may be implemented. Under PBR, for example, the highest-performing agent among available agents receives the next available task. Other PBR and PBR-like strategies may make assignments using specific information about the agents.

"Behavioral Pairing" or "BP" strategies, for assigning tasks to agents, improve upon traditional assignment methods. BP targets balanced utilization of agents while simultaneously improving overall task assignment center performance potentially beyond what FIFO or PBR methods will achieve in practice.

When determining a BP model for a BP strategy, a task assignment system may consider information about its agents and incoming tasks or types of tasks. For example, a contact center system may consider the performance history of each agent, such as an agent's conversion rate in a sales queue, and it may consider customer information about a contact, such as the type of service a customer uses or how many years the customer has had a contract with the company, and other types of data found in a typical customer relationship management (CRM) system.

In some task assignment systems, it may be advantageous for a BP model to consider whether hold activities (e.g., types of music or specific hold music) favorably or unfavorably influence task outcomes. Thus, it may be understood that there may be a need for a BP model that takes into consideration historical information associated with hold activities, and a BP strategy that pairs a task with a preferred hold activity based on the BP model in order to optimize the overall performance of a task assignment system.

SUMMARY OF THE DISCLOSURE

Techniques for behavioral pairing in a task assignment system are disclosed. In one particular embodiment, the techniques may be realized as a method for behavioral pairing in a task assignment system comprising: determining, by at least one computer processor communicatively coupled to and configured to operate in the task assignment system, information about a task waiting for assignment in the task assignment system; and selecting, by the at least one computer processor, a hold activity from a plurality of hold activities for the task based on the information about the task, wherein the selected hold activity is expected to improve performance of the task assignment system.

In accordance with other aspects of this particular embodiment, the task assignment system may be a contact center system.

In accordance with other aspects of this particular embodiment, the plurality of hold activities may be a plurality of music recordings.

In accordance with other aspects of this particular embodiment, each music recording of the plurality of music recordings may be associated with at least one of a genre, an artist, a release date, and a beats-per-minute measurement.

In accordance with other aspects of this particular embodiment, the information about the task may include at least one of an account type, an account tenure, an age or age range, and a location associated with the task.

In accordance with other aspects of this particular embodiment, the selecting the hold activity may be based on a behavioral pairing model of preferred task-hold activity pairings.

In accordance with other aspects of this particular embodiment, the behavioral pairing model may have been determined using historical task-hold activity pairings outcome data.

In another particular embodiment, the techniques may be realized as a system for behavioral pairing in a task assignment system comprising at least one computer processor communicatively coupled to and configured to operate in the task assignment system, wherein the at least one computer processor is further configured to perform the steps in the above-described method.

In another particular embodiment, the techniques may be realized as an article of manufacture for behavioral pairing in a task assignment system comprising a non-transitory processor readable medium and instructions stored on the medium, wherein the instructions are configured to be readable from the medium by at least one computer processor communicatively coupled to and configured to operate in the contact center system and thereby cause the at least one computer processor to operate so as to perform the steps in the above-described method.

The present disclosure will now be described in more detail with reference to particular embodiments thereof as shown in the accompanying drawings. While the present disclosure is described below with reference to particular embodiments, it should be understood that the present disclosure is not limited thereto. Those of ordinary skill in the art having access to the teachings herein will recognize additional implementations, modifications, and embodiments, as well as other fields of use, which are within the scope of the present disclosure as described herein, and with respect to which the present disclosure may be of significant utility.

BRIEF DESCRIPTION OF THE DRAWINGS

To facilitate a fuller understanding of the present disclosure, reference is now made to the accompanying drawings, in which like elements are referenced with like numerals.

These drawings should not be construed as limiting the present disclosure, but are intended to be illustrative only.

FIG. **1** shows a block diagram of a task assignment center according to embodiments of the present disclosure.

FIG. **2** shows a block diagram of a task assignment system according to embodiments of the present disclosure.

FIG. **3** shows a flow diagram of a task assignment method according to embodiments of the present disclosure.

DETAILED DESCRIPTION

A typical task assignment system algorithmically assigns tasks arriving at a task assignment center to agents available to handle those tasks. At times, the task assignment center may be in an "L1 state" and have agents available and waiting for assignment to tasks. At other times, the task assignment center may be in an "L2 state" and have tasks waiting in one or more queues for an agent to become available for assignment. At yet other times, the task assignment system may be in an "L3 state" and have multiple agents available and multiple tasks waiting for assignment. An example of a task assignment system is a contact center system that receives contacts (e.g., telephone calls, internet chat sessions, emails, etc.) to be assigned to agents.

In some traditional task assignment centers, tasks are assigned to agents ordered based on time of arrival, and agents receive tasks ordered based on the time when those agents became available. This strategy may be referred to as a "first-in, first-out," "FIFO," or "round-robin" strategy. For example, in an L2 environment, when an agent becomes available, the task at the head of the queue would be selected for assignment to the agent. In other traditional task assignment centers, a performance-based routing (PBR) strategy for prioritizing higher-performing agents for task assignment may be implemented. Under PBR, for example, the highest-performing agent among available agents receives the next available task.

The present disclosure refers to optimized strategies, such as "Behavioral Pairing" or "BP" strategies, for assigning tasks to agents that improve upon traditional assignment methods. BP targets balanced utilization of agents while simultaneously improving overall task assignment center performance potentially beyond what FIFO or PBR methods will achieve in practice. This is a remarkable achievement inasmuch as BP acts on the same tasks and same agents as FIFO or PBR methods, approximately balancing the utilization of agents as FIFO provides, while improving overall task assignment center performance beyond what either FIFO or PBR provide in practice. BP improves performance by assigning agent and task pairs in a fashion that takes into consideration the assignment of potential subsequent agent and task pairs such that, when the benefits of all assignments are aggregated, they may exceed those of FIFO and PBR strategies.

Various BP strategies may be used, such as a diagonal model BP strategy or a network flow BP strategy. These task assignment strategies and others are described in detail for a contact center context in, e.g., U.S. Pat. Nos. 9,300,802, 9,781,269, 9,787,841, and 9,930,180, all of which are hereby incorporated by reference herein. BP strategies may be applied in an L1 environment (agent surplus, one task; select among multiple available/idle agents), an L2 environment (task surplus, one available/idle agent; select among multiple tasks in queue), and an L3 environment (multiple agents and multiple tasks; select among pairing permutations).

When determining a BP model for a BP strategy, a task assignment system may consider information about its agents and incoming tasks or types of tasks. For example, a contact center system may consider the performance history of each agent, such as an agent's conversion rate in a sales queue, and it may consider customer information about a contact, such as the type of service a customer uses or how many years the customer has had a contract with the company, and other types of data found in a typical customer relationship management (CRM) system. As explained in detail below, embodiments of the present disclosure relates to a task assignment system that may account for historical information associated with hold activities in determining a BP model, and that may employ a BP strategy that pairs a task with a preferred hold activity based on the BP model in order to optimize its overall performance.

FIG. **1** shows a block diagram of a task assignment center **100** according to embodiments of the present disclosure. The description herein describes network elements, computers, and/or components of a system and method for pairing strategies in a task assignment system that may include one or more modules. As used herein, the term "module" may be understood to refer to computing software, firmware, hardware, and/or various combinations thereof. Modules, however, are not to be interpreted as software which is not implemented on hardware, firmware, or recorded on a non-transitory processor readable recordable storage medium (i.e., modules are not software per se). It is noted that the modules are exemplary. The modules may be combined, integrated, separated, and/or duplicated to support various applications. Also, a function described herein as being performed at a particular module may be performed at one or more other modules and/or by one or more other devices instead of or in addition to the function performed at the particular module. Further, the modules may be implemented across multiple devices and/or other components local or remote to one another. Additionally, the modules may be moved from one device and added to another device, and/or may be included in both devices.

As shown in FIG. **1**, the task assignment center **100** may include a central switch **110**. The central switch **110** may receive incoming tasks (e.g., telephone calls, interne chat sessions, emails, etc.) or support outbound connections to contacts via a dialer, a telecommunications network, or other modules (not shown). The central switch **110** may include routing hardware and software for helping to route tasks among one or more subcenters, or to one or more Private Branch Exchange ("PBX") or Automatic Call Distribution (ACD) routing components or other queuing or switching components within the task assignment center **100**. The central switch **110** may not be necessary if there is only one subcenter, or if there is only one PBX or ACD routing component in the task assignment center **100**.

If more than one subcenter is part of the task assignment center **100**, each subcenter may include at least one switch (e.g., switches **120**A and **120**B). The switches **120**A and **120**B may be communicatively coupled to the central switch **110**. Each switch for each subcenter may be communicatively coupled to a plurality (or "pool") of agents. Each switch may support a certain number of agents (or "seats") to be logged in at one time. At any given time, a logged-in agent may be available and waiting to be connected to a task, or the logged-in agent may be unavailable for any of a number of reasons, such as being connected to another contact, performing certain post-call functions such as logging information about the call, or taking a break. In the example of FIG. **1**, the central switch **110** routes tasks to one

of two subcenters via switch **120**A and switch **120**B, respectively. Each of the switches **120**A and **120**B is shown with two agents. Agents **130**A and **130**B may be logged into switch **120**A, and agents **130**C and **130**D may be logged into switch **120**B.

The task assignment center **100** may also be communicatively coupled to an integrated pairing strategy service from, for example, a third-party vendor. In the example of FIG. **1**, behavioral pairing module **140** may be communicatively coupled to one or more switches in the switch system of the task assignment center **100**, such as central switch **110**, switch **120**A, and switch **120**B. In some embodiments, switches of the task assignment center **100** may be communicatively coupled to multiple behavioral pairing modules. In some embodiments, behavioral pairing module **140** may be embedded within a component of the task assignment center **100** (e.g., embedded in or otherwise integrated with a switch).

Behavioral pairing module **140** may receive information from a switch (e.g., switch **120**A) about agents logged into the switch (e.g., agents **130**A and **130**B) and about incoming tasks via another switch (e.g., central switch **110**) or, in some embodiments, from a network (e.g., the Internet or a telecommunications network) (not shown). The behavioral pairing module **140** may process this information to determine which tasks should be paired (e.g., matched, assigned, distributed, routed) with which agents.

For example, in an L1 state, multiple agents may be available and waiting for connection to a contact, and a task arrives at the task assignment center **100** via a network or the central switch **110**. As explained above, without the behavioral pairing module **140**, a switch will typically automatically distribute the new task to whichever available agent has been waiting the longest amount of time for a task under a FIFO strategy, or whichever available agent has been determined to be the highest-performing agent under a PBR strategy. With a behavioral pairing module **140**, contacts and agents may be given scores (e.g., percentiles or percentile ranges/bandwidths) according to a pairing model or other artificial intelligence data model, so that a task may be matched, paired, or otherwise connected to a preferred agent.

In an L2 state, multiple tasks are available and waiting for connection to an agent, and an agent becomes available. These tasks may be queued in a switch such as a PBX or ACD device. Without the behavioral pairing module **140**, a switch will typically connect the newly available agent to whichever task has been waiting on hold in the queue for the longest amount of time as in a FIFO strategy or a PBR strategy when agent choice is not available. In some task assignment centers, priority queuing may also be incorporated, as previously explained. With a behavioral pairing module **140** in this L2 scenario, as in the L1 state described above, tasks and agents may be given percentiles (or percentile ranges/bandwidths, etc.) according to, for example, a model, such as an artificial intelligence model, so that an agent becoming available may be matched, paired, or otherwise connected to a preferred task.

FIG. **2** shows a block diagram of a task assignment system **200** according to embodiments of the present disclosure. The task assignment system **200** may be included in a task assignment center (e.g., task assignment center **100**) or incorporated in a component or module (e.g., behavioral pairing module **140**) of a task assignment center for helping to assign tasks among various agents.

The task assignment system **200** may include a task assignment module **210** that is configured to pair (e.g., match, assign) incoming tasks to available agents. In the example of FIG. **2**, m tasks **220**A-**220***m* are received over a given period, and n agents **230**A-**230***n* are available during the given period. Each of the m tasks may be assigned to one of the n agents for servicing or other types of task processing. In the example of FIG. **2**, m and n may be arbitrarily large finite integers greater than or equal to one. In a real-world task assignment center, such as a contact center, there may be dozens, hundreds, etc. of agents logged into the contact center to interact with contacts during a shift, and the contact center may receive dozens, hundreds, thousands, etc. of contacts (e.g., telephone calls, internet chat sessions, emails, etc.) during the shift.

In some embodiments, a task assignment strategy module **240** may be communicatively coupled to and/or configured to operate in the task assignment system **200**. The task assignment strategy module **240** may implement one or more task assignment strategies (or "pairing strategies") for assigning individual tasks to individual agents (e.g., pairing contacts with contact center agents). A variety of different task assignment strategies may be devised and implemented by the task assignment strategy module **240**. In some embodiments, a FIFO strategy may be implemented in which, for example, the longest-waiting agent receives the next available task (in L1 environments) or the longest-waiting task is assigned to the next available agent (in L2 environments). In other embodiments, a PBR strategy for prioritizing higher-performing agents for task assignment may be implemented. Under PBR, for example, the highest-performing agent among available agents receives the next available task. In yet other embodiments, a BP strategy may be used for optimally assigning tasks to agents using information about either tasks or agents, or both. Various BP strategies may be used, such as a diagonal model BP strategy or a network flow BP strategy. See U.S. Pat. Nos. 9,300,802, 9,781,269, 9,787,841, and 9,930,180.

In some embodiments, a historical assignment module **250** may be communicatively coupled to and/or configured to operate in the task assignment system **200** via other modules such as the task assignment module **210** and/or the task assignment strategy module **240**. The historical assignment module **250** may be responsible for various functions such as monitoring, storing, retrieving, and/or outputting information about task-agent assignments that have already been made. For example, the historical assignment module **250** may monitor the task assignment module **210** to collect information about task assignments in a given period. Each record of a historical task assignment may include information such as an agent identifier, a task or task type identifier, offer or offer set identifier, outcome information, or a pairing strategy identifier (i.e., an identifier indicating whether a task assignment was made using a BP strategy, a BP strategy, or some other pairing strategy such as a FIFO or PBR pairing strategy).

In some embodiments and for some contexts, additional information may be stored. For example, in a call center context, the historical assignment module **250** may also store information about the time a call started, the time a call ended, the phone number dialed, and the caller's phone number. For another example, in a dispatch center (e.g., "truck roll") context, the historical assignment module **250** may also store information about the time a driver (i.e., field agent) departs from the dispatch center, the route recommended, the route taken, the estimated travel time, the actual travel time, the amount of time spent at the customer site handling the customer's task, etc.

In some embodiments, the historical assignment module **250** may generate a pairing model, a BP model, or similar computer processor-generated model based on a set of historical assignments for a period of time (e.g., the past week, the past month, the past year, etc.), which may be used by the task assignment strategy module **240** to make task assignment recommendations or instructions to the task assignment module **210**.

In some embodiments, the historical assignment module **250** may generate a BP model based on historical pairings between tasks and hold activities, and the corresponding outcomes of the pairings. For example, in a call center context, when a caller calls a service provider to reconcile a billing issue, cancel service, report a customer support issue, buy an additional device or service, inquire about a new accessory, etc., the caller is usually guided through a series of options leveraging a technology known as an interactive voice response (IVR) system. Once the caller makes her selections to get to an appropriate queue from which she will be getting assistance, the IVR system may stream a music recording selected randomly from a library or a catalog in a media server component of the IVR system platform. Each music recording may be tagged with metadata that describes the underlying components of the music recording that was played while the caller was waiting on hold. The metadata may include a genre, artist, date of the original recording's release, beats per minute, etc. associated with the music recording.

IVR data may be used to inform a BP model and BP strategy to understand the intent of a caller (e.g., billing inquiry, technical support, sales, upgrades, cancel service, etc.) and optimally pair the caller with the highest performing hold music while the caller waits to talk to a call center agent. For example, the historical assignment module **250** may join metadata of music recordings to historical task-agent pairing outcome data, as well as CRM data and third-party data, in order to model the effect of the music recordings on the task-agent pairing outcomes. The CRM data and third-party data may include, for each caller, a location (e.g., billing address or ZIP code), an age or age range, a credit score range, an income level, an account type (e.g., prepaid, single account, post-paid family account), a tenure, a device type, etc. Thus, based on a BP model informed of historical task-hold activity pairings from the historical assignment module **250**, the task assignment strategy module **240** may apply a BP strategy to select an optimal hold activity (e.g., a music recording of specific genre, artist, beats per minute, etc.) for a given caller/task.

In some embodiments, a benchmarking module **260** may be communicatively coupled to and/or configured to operate in the task assignment system **200** via other modules such as the task assignment module **210** and/or the historical assignment module **250**. The benchmarking module **260** may benchmark the relative performance of two or more pairing strategies (e.g., FIFO, PBR, BP, etc.) using historical assignment information, which may be received from, for example, the historical assignment module **250**. In some embodiments, the benchmarking module **260** may perform other functions, such as establishing a benchmarking schedule for cycling among various pairing strategies, tracking cohorts (e.g., base and measurement groups of historical assignments), etc. Benchmarking is described in detail for the contact center context in, e.g., U.S. Pat. No. 9,712,676, which is hereby incorporated by reference herein.

In some embodiments, the benchmarking module **260** may benchmark the relative performance of a BP strategy that allows for random hold activities (e.g., music recordings) and a BP strategy that optimally selects a hold activity for a given task based on a BP model informed of historical task-hold activity pairings. For example, the benchmarking module **260** may find that, when retention callers aged 35-55 from the East Coast of the United States are played reggae music with 70-80 beats per minute (e.g., Bob Marley's "Three Little Birds" song), there is a 1.5% increase in retention. As another example, the benchmarking module **260** may find that, when accessory sales callers aged 17-32 from the Midwest of the United States are played higher energy alternative rock with 135-150 beats per minute (e.g., U2's "Vertigo" song), accessory sales have an 3.2% increase in revenue.

In some embodiments, the benchmarking module **260** may output or otherwise report or use the relative performance measurements. The relative performance measurements may be used to assess the quality of the task assignment strategy to determine, for example, whether a different task assignment strategy (or a different pairing model) should be used, or to measure the overall performance (or performance gain) that was achieved within the task assignment system **200** while it was optimized or otherwise configured to use one task assignment strategy instead of another.

FIG. **3** shows a task assignment method **300** according to embodiments of the present disclosure. The task assignment method **300** may be for BP in a task assignment system (e.g., task assignment system **200**). Task assignment method **300** may begin at block **310**. At block **310**, the task assignment method **300** may determine information about a task waiting for assignment in a task assignment system. For example, in the context of a call center, the information about the task may include CRM data and third-party data a location (e.g., billing address or ZIP code), an age or age range, a credit score range, an income level, an account type, a tenure, a device type, etc. associated with a caller.

At block **320**, the task assignment method **300** may select a hold activity from a plurality of hold activities for the task based on the information about the task. For example, in the context of a call center, based on the information associated with a caller, the task assignment method may apply a BP strategy with a BP model of preferred task-hold activity pairings to select an optimal hold activity (e.g., a music recording) for the caller, such that the overall performance of the task assignment system (i.e., the call center) is improved.

At this point it should be noted that task assignment in accordance with the present disclosure as described above may involve the processing of input data and the generation of output data to some extent. This input data processing and output data generation may be implemented in hardware or software. For example, specific electronic components may be employed in a behavioral pairing module or similar or related circuitry for implementing the functions associated with task assignment in accordance with the present disclosure as described above. Alternatively, one or more processors operating in accordance with instructions may implement the functions associated with task assignment in accordance with the present disclosure as described above. If such is the case, it is within the scope of the present disclosure that such instructions may be stored on one or more non-transitory processor readable storage media (e.g., a magnetic disk or other storage medium), or transmitted to one or more processors via one or more signals embodied in one or more carrier waves.

The present disclosure is not to be limited in scope by the specific embodiments described herein. Indeed, other vari-

ous embodiments of and modifications to the present disclosure, in addition to those described herein, will be apparent to those of ordinary skill in the art from the foregoing description and accompanying drawings. Thus, such other embodiments and modifications are intended to fall within the scope of the present disclosure. Further, although the present disclosure has been described herein in the context of at least one particular implementation in at least one particular environment for at least one particular purpose, those of ordinary skill in the art will recognize that its usefulness is not limited thereto and that the present disclosure may be beneficially implemented in any number of environments for any number of purposes. Accordingly, the claims set forth below should be construed in view of the full breadth and spirit of the present disclosure as described herein.

The invention claimed is:

1. A method for behavioral pairing in a task assignment system comprising:

determining, by at least one computer processor communicatively coupled to and configured to operate in the task assignment system, information about a task waiting for assignment in the task assignment system;

determining, by the at least one computer processor, a highest-performing hold activity from a plurality of hold activities for the task based on information about the task and a plurality of historical task-hold activity pairings; and

selecting, by the at least one computer processor, the highest-performing hold activity from the plurality of hold activities for the task, wherein the selected hold activity is expected to improve performance of the task assignment system for a task-agent pairing involving the task, wherein the task and the task-agent pairing are otherwise unrelated to the highest-performing hold activity.

2. The method of claim **1**, wherein the task assignment system is a contact center system.

3. The method of claim **1**, wherein the plurality of hold activities is a plurality of music recordings.

4. The method of claim **3**, wherein each music recording of the plurality of music recordings is associated with at least one of a genre, an artist, a release date, and a beats-per-minute measurement.

5. The method of claim **1**, wherein the information about the task includes at least one of an account type, an account tenure, an age or age range, and a location associated with the task.

6. The method of claim **1**, wherein determining the highest-performing hold activity is further based on a behavioral pairing model of preferred task-hold activity pairings.

7. The method of claim **6**, wherein the behavioral pairing model is determined using historical task-hold activity pairings outcome data.

8. A system for behavioral pairing in a task assignment system comprising:

at least one computer processor communicatively coupled to and configured to operate in the task assignment system, wherein the at least one computer processor is further configured to:

determine information about a task waiting for assignment in the task assignment system;

determine a highest-performing hold activity from a plurality of hold activities for the task based on information about the task and a plurality of historical task-hold activity pairings; and

select the highest-performing hold activity from the plurality of hold activities for the task, wherein the selected hold activity is expected to improve performance of the task assignment system for a task-agent pairing involving the task, wherein the task and the task-agent pairing are otherwise unrelated to the highest-performing hold activity.

9. The system of claim **8**, wherein the task assignment system is a contact center system.

10. The system of claim **8**, wherein the plurality of hold activities is a plurality of music recordings.

11. The system of claim **10**, wherein each music recording of the plurality of music recordings is associated with at least one of a genre, an artist, a release date, and a beats-per-minute measurement.

12. The system of claim **8**, wherein the information about the task includes at least one of an account type, an account tenure, an age or age range, and a location associated with the task.

13. The system of claim **8**, wherein the at least one computer processor is further configured to determine the highest-performing hold activity based on a behavioral pairing model of preferred task-hold activity pairings.

14. The system of claim **13**, wherein the behavioral pairing model is determined using historical task-hold activity pairings outcome data.

15. An article of manufacture for behavioral pairing in a task assignment system comprising:

a non-transitory processor readable medium; and

instructions stored on the medium;

wherein the instructions are configured to be readable from the medium by at least one computer processor communicatively coupled to and configured to operate in the task assignment system and thereby cause the at least one computer processor to operate so as to:

determine information about a task waiting for assignment in the task assignment system;

determine a highest-performing hold activity from a plurality of hold activities for the task based on information about the task and a plurality of historical task-hold activity pairings; and

select the highest-performing hold activity from the plurality of hold activities for the task, wherein the selected hold activity is expected to improve performance of the task assignment system for a task-agent pairing involving the task, wherein the task and the task-agent pairing are otherwise unrelated to the highest-performing hold activity.

16. The article of manufacture of claim **15**, wherein the task assignment system is a contact center system.

17. The article of manufacture of claim **15**, wherein the plurality of hold activities is a plurality of music recordings.

18. The article of manufacture of claim **17**, wherein each music recording of the plurality of music recordings is associated with at least one of a genre, an artist, a release date, and a beats-per-minute measurement.

19. The article of manufacture of claim **15**, wherein the information about the task includes at least one of an account type, an account tenure, an age or age range, and a location associated with the task.

20. The article of manufacture of claim **15**, wherein the instructions are further configured to cause the at least one computer processor to operate so as to determine the highest-performing hold activity based on a behavioral pairing model of preferred task-hold activity pairings.

21. The article of manufacture of claim 20, wherein the behavioral pairing model is determined using historical task-hold activity pairings outcome data.

22. The method of claim 1, wherein determining the highest-performing hold activity comprises:

determining a plurality of task-agent pairing outcomes for historical task-hold activity pairings;

associating each task-agent pairing outcome of the plurality of outcomes with at least one hold activity in the plurality of hold activities;

determining at least one task-agent pairing outcome based on the information about the task; and

selecting a hold activity associated with the at least one task-agent pairing outcome as the highest-performing hold activity.

23. The system of claim 8, wherein the at least one computer processor is further configured to determine the highest-performing hold activity by:

determining a plurality of task-agent pairing outcomes for historical task-hold activity pairings;

associating each task-agent pairing outcome of the plurality of outcomes with at least one hold activity in the plurality of hold activities;

determining at least one task-agent pairing outcome based on the information about the task; and

selecting a hold activity associated with the at least one task-agent pairing outcome as the highest-performing hold activity.

24. The article of manufacture of claim 15, wherein the instructions are further configured to cause the at least one computer processor to operate so as to determine the highest-performing hold activity by:

determining a plurality of task-agent pairing outcomes for historical task-hold activity pairings;

associating each task-agent pairing outcome of the plurality of outcomes with at least one hold activity in the plurality of hold activities;

determining at least one task-agent pairing outcome based on the information about the task; and

selecting a hold activity associated with the at least one task-agent pairing outcome as the highest-performing hold activity.

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